Building the Green Readiness Index: Assessing SMEs' Capability toward Sustainable Transformation

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Abstract. Micro, Small, and Medium Enterprises (MSMEs) play a critical role in national economic development, yet they encounter substantial challenges in transitioning toward sustainable business practices. This study develops the Green Readiness Index (GRI) as a diagnostic tool to assess the capability of MSMEs to undertake sustainable transformation. The construction of the index follows four stages—item selection, assessment of empirical relationships, scoring, and validation—supported by expert evaluation using the Content Validity Index (CVI). A total of 20 experts in sustainability, index development, and MSME policy participated in validating the indicators. Findings confirm strong content validity across five core dimensions: Green Awareness & Knowledge, Green Strategy & Commitment, Green Resources & Capability, Green Process & Operations, and Stakeholder & Regulatory Readiness. Despite relatively high environmental awareness among MSMEs, the study reveals a persistent implementation gap, driven primarily by limited technological capacity, financial constraints, and insufficient human resource competencies. The integration of CVI-based validation and AHP-like weighting provides a rigorous methodological foundation for measuring sustainability readiness in MSMEs. Future research is recommended to test the instrument's reliability, validate construct structures using statistical methods, and broaden the application of the index across diverse sectors and regional contexts.

Keywords: Green Readiness Index, MSMEs, sustainability; Content Validity Index, green transformation, readiness assessment.

1 Introduction

Micro, Small, and Medium Enterprise are the majority of business globally while also providing a large part of the global economy, it is vital for MSMEs to be environmentally sustainable and capable to provide a social impact (1). Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy, contributing more than 60% of the Gross Domestic Product (GDP) and employing a significant number of workers. However, MSMEs face various challenges in adapting to the sustainability practices required in an era that increasingly prioritizes environmental issues (2). Climate change and environmental crises require MSMEs to transform towards more sustainable business models, but many MSME players fail to take advantage of this opportunity due to limited knowledge and resources (3). With increasing global awareness of environmental, social, and governance (ESG) issues, there has been a paradigm shift. The global paradigm shift related to sustainability has triggered a significant transformation in accounting practices. Recent developments at the global level, both in business and the environment, have led to the emergence of new practices in corporate reporting (4). The imperative for sustainability is becoming

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increasingly urgent. Adopting Environmental, Social, and Governance (ESG) practices is not only an ethical issue, but also important for increasing shareholder confidence, controlling environmental impact, and ultimately improving business competitiveness (5). However, despite the importance of SMEs as the backbone of the economy, they collectively contribute significantly to industrial emissions and environmental degradation. Achieving meaningful sustainable change requires their active participation, yet SMEs sector often faces constraints in the form of limited resources and a lack of knowledge compared to large companies (6). This analysis shows a complex causal relationship between economic stability and environmental risk. Since SMEs are the main providers of employment, environmental regulatory pressures applied without adequate measurement of internal capabilities have the potential to threaten economic and social stability (7). Therefore, the development of the Green Readiness Index (GRI) serves as a mitigation for this risk. This index will provide the necessary diagnostic guidance for policymakers to support an inclusive and sustainable transition, in line with international development goals. Furthermore, the successful adoption of ESG practices not only impacts internal operational efficiency, but also directly increases competitiveness through the development of relational capital (Green Relational Capital). This indicates that the measurement of SME capabilities must include aspects of how they build reputation and trust in the eyes of the market and external stakeholders. The need for a Green Readiness Index (GRI) is based on academic justification and practical requirements for effective policy tools. The proposed composite index offers a structured, scalable, and policy-relevant diagnostic view. The GRI is designed to serve as a benchmarking tool that enables the identification of systemic weaknesses in SMEs, guides policy formulation, and prioritizes public investment in sectors most in need of specific intervention (8).

2 Literature Review

The transformation towards sustainable business practices is increasingly becoming a strategic necessity for Micro, Small, and Medium Enterprises (SMEs). Various studies confirm that SMEs play a significant role in the economy, but most still face challenges in systematically adopting green innovations. Therefore, the need to measure their level of readiness for sustainable transformation is becoming increasingly important. Previous literature provides a strong foundation for understanding the factors that shape this readiness. Research on eco-innovation readiness (9) shows that a company's ability to innovate in a green manner is greatly influenced by internal readiness and systemic support. These findings are reinforced (10), who show that the readiness of small industries for example, in the batik sector is determined not only by technical capacity, but also by management commitment and the intensity of environmental regulations. Meanwhile, a systematic review of the determinants of green practices in SMEs found that regulatory pressure, environmental awareness, and organizational capabilities are factors that consistently influence the successful adoption of green practices (11). Sustainable transformation readiness cannot be separated from digital capabilities, especially since many green innovations today are technology-based (12) emphasize that sustainability readiness, which encompasses people, process, and technology, contributes to the digital transformation of SMEs. This study is in line with the findings of (13), which show that organizational competence and continuous learning are important foundations for digital readiness. On the other hand, a quantitative study (14)Confirms that digital

capabilities and access to credit play an important role in facilitating green innovation in the SME sector. Research on green innovation also contributes significantly to the understanding of green readiness. A study (15) shows that green innovation driven by intellectual capital can improve the business performance of SMEs. Meanwhile, Green Innovation Management in Indonesian SMEs (16) highlights the importance of integrating management capabilities and technology adoption to drive the success of green innovation. These findings are expanded upon by research (17), which states that green creativity and green IT empowerment can strengthen green competitive advantage. Furthermore,(18) adds that a green entrepreneurial orientation can strengthen the relationship between organizational capabilities and sustainability performance. Another dimension that is beginning to receive attention is green organizational culture and the role of leadership (19) also emphasize the importance of aligning managerial strategies, Green IT, and corporate social responsibility to strengthen the foundation of organizations towards green transformation. Readiness is not a binary condition ready or not ready but rather a spectrum built on layers of interdependent foundations. To navigate this complexity, a structured and hierarchical framework is needed. The model I will present below is a visualization of this systematic approach. This diagram maps the organization's journey from the most basic cognitive stage to achieving operational maturity, which can be measured in a comprehensive Green Readiness Index.

Figure 1. Model Green Readiness Index (GRI)



3 Methodology

The proposed methodology is Mix Method The First Method is a quantitative to set the scale, but used in a qualitative-based validation process using the CVI (Content Validity Index) model. The index construction will follow four fundamental steps: (a) item

selection, (b) examination of empirical relationships between items, (c) item scoring, and (d) index validation. The selection of expert panels in this study was conducted to ensure that the Green Readiness Index (GRI) development process obtained strong theoretical and substantive validity. with expert ratings for each indicator
1 = Not relevant
2 = Somewhat relevant
3 = Quite relevant
4 = Highly relevant

$$CVI = \frac{\text{Number of experts who gave a score of 3 or 4}}{\text{Total Number of Experts}}$$

The expert panel was selected through a purposive sampling approach, taking into account the experts' competence, experience, and relevance to the domain of sustainability, index development methodology, and environmental and MSME policies. The number of experts involved ranged from 15 to 25, in accordance with the expert elicitation standards in the development of readiness models and multidimensional indices. In general, the expert panel selection process is carried out in three stages. First, researchers conduct an initial identification of potential experts from various sources, such as scientific publications, professional associations, structural positions in government agencies, and track records of involvement in sustainability issues. This identification covers three main categories of experts: (a) sustainability experts, including academics and practitioners experienced in ESG, green transformation, and the circular economy; (b) index development experts, namely statisticians, capability model developers, and multidimensional index researchers; and (c) regulators or policymakers, particularly those involved in environmental regulation, MSME development, and sustainable finance. The following table shows a list of potential expert panel members compiled in Excel format. This structure is used as a basis for mapping and selecting experts with the most relevant qualifications.

Table 1. Expert Panel Selection Matrix

Expert Name	Category	Expertise Focus	Reason for Selection
Expert 1	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.
Expert 2	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 3	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 4	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.

Expert 5	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 6	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 7	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.
Expert 8	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 9	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 10	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.
Expert 11	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 12	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 13	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.
Expert 14	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 15	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 16	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.
Expert 17	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.
Expert 18	Regulator / Policymaker	Environmental Policy, Green Finance, UMKM Development	Selected based on expertise in environmental policy, green finance, umkm development.
Expert 19	Sustainability Expert	Sustainability Accounting, ESG, Circular Economy	Selected based on expertise in sustainability accounting, esg, circular economy.

Expert 20	Index Development Expert	Index Construction, SEM/PLS Modeling, Indicator Development	Selected based on expertise in index construction, sem/pls modeling, indicator development.

Source: Processed data

4 Research Results

4.1 Dimensions of the Green Readiness Index

Data was collected through Focus Group Discussions (FGDs). Interviews were conducted with SME owners or managers, focusing on the sustainability strategies they had used, how they determined the success or failure of these strategies, the biggest challenges they faced during implementation, and how they used technology to stay connected with market developments and resources. Purposeful sampling was used to select research subjects to cover the diversity of sectors and levels of readiness in the study area.

Table 2. Dimensions of the Green Readiness Index

Dimension	Indicator
Green Awareness & Knowledge Readiness	MSMEs' understanding of the concept of sustainability
	Knowledge of environmental issues relevant to business
	Involvement in training or outreach related to environmental issues
	Awareness of environmental regulations and standards
	Knowledge of the economic benefits of green practices
Green Strategy & Organizational Commitment Readiness	There is a commitment from the owner/management to implement green practices
	Integration of environmental aspects into business vision or strategy
	The existence of environmental goals or targets (informal or formal)
	Sustainability as a basis for operational decision making
	Management's concern for green branding
Green Resources & Capability Readiness	Budget availability for the implementation of green practices
	MSME access to environmentally friendly technology
	HR competencies in operational sustainability
	Availability of time, manpower and implementation capacity
	External support: partners, government, green funding

Green Process & Operational Readiness	Adequate waste management
	Efficient use of energy
	Use of environmentally friendly raw materials
	Implementation of the reduce–reuse–recycle principle
	Internal evaluation of the environmental impact of production processes
Green Stakeholder & Regulatory Readiness	Adequate waste management
	Efficient use of energy
	Use of environmentally friendly raw materials
	Implementation of the reduce–reuse–recycle principle
	Internal evaluation of the environmental impact of production processes

Source : Processed data

4.2 Readiness Level of SMEs

Using the validated indicators and weighting scheme, SMEs' readiness scores were calculated. The readiness levels were divided into three categories: (a) Low Readiness (0.00–0.33), (b) Moderate Readiness (0.34–0.66), (c) High Readiness (0.67–1.00). A total of 20 experts were involved in validating the index indicators, consisting of Sustainability experts (n = 8), Index development and measurement experts (n = 6), Government regulators and SME policymakers (n = 6), Experts evaluated each indicator based on relevance, clarity, and representativeness. Content validity was calculated using the Content Validity Index (CVI).

Table 3. Content Validity Index

Dimension	Item CVI Range	Average CVI	Interpretation
Green Awareness & Knowledge	0.82–0.95	0,061805556	Valid
Green Strategy & Commitment	0.80–0.94	0,061111111	Valid
Green Resources & Capability	0.78–0.92	0,059722222	Valid (some revised)
Green Process & Operations	0.83–0.97	0,063194444	Very Valid
Stakeholder & Regulatory Readiness	0.79–0.93	0,060416667	Valid

Source : Processed data

Most indicators surpassed the minimum CVI threshold (0.79), indicating strong agreement among experts. Three indicators were revised for clarity based on feedback. Experts assessed the relative importance of each dimension using a pairwise comparison approach (AHP-like weighting).

Table 4. Dimension Weights

Dimension	Weight
Green Awareness & Knowledge	00.18
Green Strategy & Commitment	00.22
Green Resources & Capability	00.20
Green Process & Operations	00.24
Stakeholder & Regulatory Readiness	00.16

Source : Processed data

4.3 Dimension Level Findings

a. Green Awareness & Knowledge (Score: 0.61 – Moderate High)
SMEs generally understand basic environmental issues such as waste reduction and energy efficiency. Awareness of regulatory requirements was higher than expected, partly due to increasing government campaigns. Key insight: High awareness does not automatically translate into green strategy or investment behavior.

b. Green Strategy & Organizational Commitment (Score: 0.54 – Moderate)
While many SMEs expressed interest in sustainability, only a few had formal or documented strategies. Most actions remain informal and reactive rather than strategic. Discussion: This confirms the findings of previous studies that SME sustainability is often driven by personal values of owners rather than formal policy.

c. Green Resources & Capability (Score: 0.47 – Low Moderate)
SMEs struggle with access to: financing for green investments, technological tools, skilled workforce. Resource constraints remain a major barrier to transition. Interpretation: This dimension is the biggest bottleneck hindering readiness growth.

d. Green Process & Operational Readiness (Score: 0.45 – Low Moderate)
Only 25–35% SMEs have implemented: structured waste management, energy efficiency measures, cleaner production techniques, Adoption is uneven and often minimal.
Insight: High awareness but low implementation suggests a knowledge–action gap.

e. Stakeholder & Regulatory Readiness (Score: 0.52 – Moderate)
SMEs are responsive to: growing consumer demand for eco-friendly products, new environmental policies, market pressure from large buyers. However, certification (e.g., ecolabel) remains extremely low. Interpretation: External pressure acts as a motivator, but compliance capability is still limited.

5 Limitations

This study has several limitations that should be acknowledged when interpreting the findings. First, the validation process relied primarily on expert judgment through the Content Validity Index (CVI). Although CVI offers strong content validation, it does not fully capture the statistical reliability or construct validity of the measurement model, which requires further quantitative testing such as exploratory and confirmatory factor analyses. Second, the weighting procedure, which adopted an AHP-like pairwise

comparison approach, is inherently subjective and depends heavily on the perceptions of the experts involved; different expert compositions may result in variations in the assigned weights. Third, the empirical data used to identify readiness levels were obtained from a limited number of MSMEs through purposive sampling and focus group discussions, which may restrict the generalizability of the results across diverse sectors or regions. Fourth, the readiness assessment focuses on perceived capabilities and self-reported practices, which may introduce bias due to overestimation or social desirability tendencies. Finally, the study does not yet incorporate longitudinal observations, making it difficult to evaluate changes in green readiness over time or to assess the impact of evolving regulatory and market conditions. Future research should address these limitations by expanding sample coverage, applying more robust statistical validation techniques, and incorporating temporal analysis to strengthen the predictive and diagnostic value of the Green Readiness

6 Conclusions

The CVI-based validation approach shows that all dimensions and indicators developed have a strong level of relevance according to experts. Pairwise comparison evaluation (AHP-like) consistently places some dimensions as higher priorities than others, resulting in clear weights that can be used as a basis for measurement, analysis, or further research instrument development. Overall, the integration of CVI for content validity and AHP-like weighting provides an adequate methodological framework to ensure that each dimension is not only conceptually relevant but also proportional in its level of importance. However, further research is still needed to test reliability, confirm the construct structure statistically, and expand the application of the instrument to more diverse contexts..

References

1. Alam S, Ramadhani WP. Transformasi Digital UMKM Di Indonesia Selama Pandemi. Journal Social Society [Internet]. 2023;3(2). Available from: https://doi.org/10.30605/jss.3.2.2023.344
2. Carlsson R, Nevzorova T. Measuring sustainable transformation of small and medium-sized enterprises using management systems standards. Business Strategy and the Environment. 2025 Jan;34(1):708–23.
3. Sobar A, Permadi I, Alhidayatullah A, Fathussyaadah E. Peningkatan Kualitas Produk Dan Layanan Umkm Untuk Meningkatkan Daya Saing. JMM (Jurnal Masyarakat Mandiri). 2023 Aug 2;7(4):3782.
4. Smith Purba A, Dwi Jayanti R, Hasriadi L, Nur Khairin F, kunci Siklus K. Bagaimana Konsep Siklus Akuntansi Berkelanjutan Berbeda dari Praktik Siklus Akuntansi Tradisional dalam Pelaporan Perusahaan Indonesia? Literature Review How do Sustainable Accounting Cycle Concepts Differ From Traditional Accounting Cycle Practices In Indonesian Corporate Reporting? A Literature Review. 2025;22(2).
5. Gorondutse, A. H., Arshad, D., & Alshuaibi, A. S. Driving sustainability in SMEs' performance: The effect of strategic flexibility. Journal of Strategy and Management. 2021, 14(1), 64–81. (2021)
6. Ozturk I, Alqassimi O, Ullah S. Digitalization and SMEs development in the context of sustainable development: A China perspective. Heliyon. 2024 Mar 30;10(6).
7. Philbin S, Viswanathan R, Telukdarie A. Understanding how digital transformation can enable SMEs to achieve sustainable development: A systematic literature review. Small Business International Review. 2022 May 31;6(1):e473.
8. Mohd Saman NR, Mahmud N, Mat Nor N, Kamaludin MA. Green Innovation and SMEs' Sustainability Performance: A Comprehensive Review. PaperASIA. 2025 Sep 18;41(5b):28–38.
9. Pigosso DCA, Schmiegelow A, Andersen MM. Measuring the readiness of SMEs for eco-innovation and industrial symbiosis: Development of a screening tool. Sustainability (Switzerland). 2018 Aug 12;10(8).
10. Ayu Kusumawardani SD, Kurnani TBA, Astari AJ, Sunardi S. Readiness in implementing green industry standard for SMEs: Case of Indonesia's batik industry. Heliyon. 2024 Aug 30;10(16).
11. Ernawati E, Fauziana DR. Investigating Determinants of SMEs' Green Practices: A Literature Review and Proposed Model. Indonesian Journal of Sustainability Accounting and Management. 2025 Aug 21;9(1).
12. Dyah A, Citraresmi P, Rucitra AL, Amalia F, Mustaniroh SA, Kartikaningrum W. Effect of sustainability readiness on digital transformation adoption in SMEs. Advances in Food Science, Sustainable Agriculture and Agroindustrial Engineering. 2023(4):338–49.
13. González-Varona JM, López-Paredes A, Poza D, Acebes F. Building and development of an organizational competence for digital transformation in SMEs. Journal of Industrial Engineering and Management. 2021;14(1):15–24.
14. Bindeeba DS, Tukamushaba EK, Bakashaba R. How digital capabilities and credit access influence green innovation performance in small and medium enterprises in resource constrained settings. Discover Sustainability. 2025 Dec 1;6(1).
15. Rustiarini NW, Bhegawati DAS, Mendra NPY. Does Green Innovation Improve SME Performance? Economies. 2022 Dec 1;10(12).
16. Kania D, Bukhori RF. Green Innovation Management in Indonesian SMEs: Drivers, Barriers, and Performance Implications for Sustainable Business Development.

17. Setyaningrum RP, Kholid MN, Susilo P. Sustainable SMEs Performance and Green Competitive Advantage: The Role of Green Creativity, Business Independence and Green IT Empowerment. Sustainability (Switzerland). 2023 Aug 1;15(15).
18. Asad M, Majali T, Aledeinat M, Abdelkarim Almajali D, Akhorshaideh AHO. Green entrepreneurial orientation for enhancing SMEs financial and environmental performance: Synergetic moderation of green technology dynamism and knowledge transfer and integration. Cogent Business and Management. 2023;10(3).
19. Hba R, Bakkas A, El Manouar A, Janati Idrissi MA. Eco-Strategy: Towards a New Generation Managerial Model Based on Green IT and CSR. International Journal of Computer Science and Information Technology. 2016 Apr 30;8(2):51–62.

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